1-21 (canceled)

22.(new) An optical waveguide circuit comprising:

at least one optical waveguide; and

a slab waveguide connected to said at least one optical waveguide,

said at least one optical waveguide and slab waveguide comprising: a first core;

a cladding that buries said first core; and

a second core that is formed between said first core and cladding,

wherein said second core is so formed throughout said at least optical waveguide and slab waveguide as to cover said first core,

the refractive index of said second core is higher than

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

the refractive index of said cladding, and

the boundary between said second core and cladding is made smooth.

23.(new) An optical. waveguide circuit that allows an optical signal propagating through at least one optical waveguide to branch into a plurality of optical waveguides, or converges optical signals propagating through a plurality of optical waveguides into at least one optical waveguide,

said at least one optical waveguide and plurality of optical waveguides comprising:

a first core that branches from at least one core to a plurality of cores or that is converged from a plurality of cores into at least one core;

a cladding that buries at least said first core; and

a second core formed between said first core and cladding,

wherein each interval between the branches of said first core that branches in the plurality of optical waveguides becomes wider as said first core gets away from a branch point

or converging point of an optical signal,

said second core of said plurality of optical waveguides is formed in the gaps between said branches of first core at the position in the vicinity of the branch point or converging point,

said second core is so formed throughout said at least one optical waveguide and plurality of optical waveguides as to cover said first core,

the refractive index of said second core 1S higher than the refractive index of said cladding,

the boundary between said second core and cladding is made smooth, and

the film thickness of said second core formed in the gaps between said branches of first core becomes thinner as the interval between said branches of first core becomes wider.

24.(new) The optical waveguide circuit according to claim 23 wherein said optical waveguide circuit is a Y-shaped branch

circuit.

25.(new) An optical waveguide circuit comprising:

a first slab waveguide connected at least one input waveguide;

a second slab waveguide connected at least one output waveguide; and

arrayed waveguides formed between said first and second slab waveguides with optical path length differences,

said first slab waveguide, said second slab waveguide and said arrayed waveguides comprising: a first core that branches in the arrayed waveguides and that is converged into at least one core in said first or second slab waveguides;

a cladding that buries said first core: and

a second core formed between said first core and cladding, wherein said second core of said arrayed waveguides is formed in the gaps between the branches of said first core at connection areas between said first and second slab waveguides and said arrayed waveguides and the portion near the

connection areas,

said second core is so formed throughout said first slab waveguide, arrayed waveguides, and second slab waveguide as to cover said first core,

the refractive index of said second core is higher than the refractive index of said cladding,

the boundary between said second core and cladding is made smooth, and

the film thickness of said second core formed in the gaps between said branches of first core of said arrayed waveguides becomes thinner as the interval between said branches of first core becomes wider.

26.(new) An optical waveguide circuit comprising proximity waveguides in which a plurality of first cores are nearby arranged to each other,

said optical waveguide comprising:

a plurality of first cores;

a cladding that buries said first cores; and

a second core that is formed between said first cores and cladding to cover said first cores,

wherein said second core is formed in the gaps between said first cores in said proximity waveguides, and said second core is not formed in the gaps between said first cores in the waveguides other than said proximity waveguides,

the refractive index of said second core is higher than the refractive index of said cladding, and

the boundary between said second core and cladding is made smooth.

27.(new) The optical waveguide circuit according to claim 22, wherein said first core that is covered by said second core has a substantially rectangular cross-section, and said second core covers the. upper surface and both side surfaces of said first core.

28.(new) The optical waveguide circuit according to claim 23, wherein said first core that is covered by said second core

has a substantially rectangular cross-section, and said second core covers the upper surface and both side surfaces of said first core.

29.(new) The optical waveguide circuit according to claim 25, wherein said first core that is covered by said second core has a substantially rectangular cross-section, and said second core covers the upper surface and both side surfaces of said first core.

30.(new) The optical waveguide circuit according to claim 26, wherein said first core that is covered by said second core has a Substantially rectangular cross-section, and said second core covers the upper surface and both side surfaces of said first core.

31.(new) The optical waveguide circuit according to claim 22, wherein the thickness of said second core that covers at least a part of said first core is less than or equal to twice the thickness of said first core.

32. (new) The optical waveguide circuit according to claim 23, wherein the thickness of the second core that covers at least a part of said first core is less than or equal to twice the thickness of said first core.

33. (new) The optical waveguide circuit according to claim 25, wherein the thickness of said second core that covers at least a part of said first core is less than or equal to twice the thickness of said first core.

34. (new) The optical waveguide circuit according to claim 26, wherein the thickness of said second core that covers at least a part of said first core is less than or equal to twice the thickness of said first core.

35. (new) The optical waveguide circuit according to claim 22, wherein the refractive index of said second core is less than or equal to 1.01 times the refractive index of said first core.

36. (new) The optical waveguide circuit according to claim 23, wherein the refractive index of said second core is less than or equal to 1.01 times the refractive index of said first core.

37. (new) The optical waveguide circuit according to claim 25, wherein the refractive index of said second core is less than or equal to 1.01 times the refractive index of said first core.

38. (new) The optical waveguide circuit according to claim 26, wherein the refractive index of said second core is less than or equal to 1.01 times the refractive index of said first core.

39.(new) A manufacturing method of an optical waveguide circuit comprising: at least one optical waveguide; and a slab waveguide connected to said at least one optical waveguide, said method comprising at least the steps of:

forming a core layer;

selectively etching said core layer to form a first core throughout said at least one optical waveguide and slab waveguide;

forming a second core layer that covers the upper surface and both side surfaces of said first core, said second core layer being made of a material having a refractive index higher than the refractive index of said cladding;

applying a heat reflow to said second core layer to smooth the surface thereof to complete a second core; and forming said cladding on said second core.

40.(new) A manufacturing method of an optical waveguide circuit that allows an optical signal propagating through at least one optical waveguide to branch into a plurality of optical waveguides, or converges optical signals propagating

through a plurality of waveguides into at least one optical waveguide, said method comprising at least the steps of:

forming a core layer;

selectively etching said core layer to form a first core that branches from at least one core to a plurality of cores or that is converged from a plurality of cores into at least one core, each interval of the branches of said first core becoming wider as said first core gets away from a branch point or converging point of an optical signal;

forming a second core layer on the upper portion of said first core and between the branches of said first core throughout said at least one optical waveguide and plurality of optical waveguides, said second core layer being made of a material having a refractive index higher than the refractive index of said cladding;

applying a heat reflow to said second core layer to smooth the surface thereof and forming a second core such that

the film thickness of said second core layer that is formed in the gaps between the branches of said first core becomes thinner as the interval between the branches of said first core becomes wider; and

forming said cladding on said second core.

41.(new) A manufacturing method of an optical waveguide circuit comprising: a first slab waveguIde connected at least one input waveguide; a second slab waveguide connected at least one output waveguide; and arrayed waveguides including a plurality of cores and formed between said first and second slab waveguides with optical path length differences, said method comprising at least the steps of:

forming a core layer;

selectively etching said core layer to form said first core that branches in connection points between said first and second slab waveguides and arrayed waveguides in said first slab waveguide, arrayed waveguides, and second slab waveguide, each interval of the branches of said first core becoming

wider as said first core gets away from a connection point between said first and second slab waveguides and the arrayed waveguides;

forming a second core layer on the upper portion of said first core and between the branches of said first core at least throughout said first slab waveguide, arrayed waveguides, and second slab waveguide, said second core layer being made of a material having a refractive index higher than the refractive index of said cladding;

applying a heat reflow to said second core layer to smooth the surface thereof and forming a second core such that the film thickness of said second core layer that is formed in the gaps between the branches of said first core becomes thinner as the interval between the branches of said first core becomes wider; and

forming said cladding on said second core.

42.(new) A manufacturing method of an optical waveguide

circuit comprising proximity waveguides in which a plurality of first cores are nearby arranged to each other, said method comprising at least the steps of:

forming a core layer:
selectively etching said core layer to form the plurality of first cores;

forming a second core layer on the upper portion of each of said first cores and between said first cores, said second core layer being made of a material having a refractive index higher than the refractive index of said cladding;

applying a heat reflow to said second core layer to smooth the surface thereof to form a second core in the gaps between said first cores in said proximity waveguides such that said second core is not formed in the gaps between said first cores in the waveguides other than said proximity waveguides; and

forming said cladding on said second core.